OLD GROWTH POLICY
Department of Environmental Management
Division of Forests and Parks
Bureau of Forestry

Massachusetts' Old-Growth Forests

Old-growth forests are valued for their scientific, ecological and social significance. From a scientific perspective they serve as windows to the past. Increment cores of tree growth, microtopography and other features provide information that can be analyzed to ascertain past climatic events, forest fires and insect infestations that may have occurred hundreds of years ago (Henry and Swan, 1974)). Old-growth forests provide opportunities to acquire baseline data that can help us understand how forest ecosystems develop over time without human influence. They are valued ecologically because they provide some habitat components that are not common in young forests. We are not aware of any organisms that are dependent on old growth for their existence in Massachusetts, although a number of organisms preferentially inhabit older forests. Old-growth forests are revered for the social values associated with them. They provide a backdrop for some forms of outdoor recreation and some individuals take great comfort in knowing that there are some areas of forest land set aside in a wild and natural state and allowed to develop free from human influences.

The first formal inventory of old-growth forests in Massachusetts was carried out in 1993 by Dr. Peter Dunwiddie for the Massachusetts Natural Heritage Program. He analyzed 13 stands having a combined area of over 350 acres. These stands averaged approximately 25 acres in size and were located in Berkshire and Franklin Counties. Since that time, Dunwiddie and Robert Leverett have published an article, an update of Dunwiddie's earlier one, in *Rhodora - The Journal of the New England Botanical Club*, entitled *Survey of Old-Growth Forest in Massachusetts*. This survey documented an additional 15 stands in western Massachusetts and one in central Massachusetts. The total acreage reported in this most recent survey was 630 acres. These acreage figures are only approximate because these areas are located in rough, steep terrain and their often indistinct stand boundaries make precise delineation difficult. For the most part, these stands occur on lands administered by the Department of Environmental Management (DEM) although three of them are on private land. Until such time as a more authoritative source or more detailed information becomes available, such as through the development of site-specific plans, the stands on DEM land documented in the two previously cited papers shall be considered to be the old-growth stands to which this policy will apply.

DEM's approach to the management of old-growth forests has always assumed a low profile. Little effort has been made to publicize either the existence or location of these stands and that will continue to be the case. The only attempt to achieve public recognition for any of them took place in the early 1970s when a section of the Mohawk Trail and Savoy Mountain State Forests was dedicated as a Society of American Foresters (SAF) Representative Natural Area. This took place following the recognition accorded the Cold River area by the investigative work by Robert Livingston and Paul Hosier of the University of Massachusetts Botany Department (Hosier, 1969). Shortly after that, the Hopper, on the west slopes of Mt. Greylock, which contains several old growth stands, was dedicated as an SAF Representative Natural Area and as a National Natural History Landmark. Recently, the "discovery" of an old-growth area on Mount Wachusett that, heretofore, did not meet the contemporary definition of an old-growth forest has prompted a great deal of public interest in these areas.

In light of this interest, DEM has developed draft policies that were first presented at a public meeting at Mount Wachusett in July of 1997. Following that, written policies were circulated to the individuals and organizations that had previously expressed an interest in the management of old-growth forests for their comments. The policies were also published in the *Environmental Monitor*, to solicit public comments. A number of comments were received and the draft policies have been modified to accommodate them. The degree to which DEM can implement these policies and fulfill its other commitments will depend on a significant increase in its management resources.

These policies will be reviewed annually to determine if they reflect current scientific thought relating to old-growth forests. At the time of the review any additional old-growth areas that have been noted will be considered for inclusion in the list of areas referenced by these policies.

The policies for the management of old-growth forests on DEM land that were adopted by the DEM Board on December 17, 1998 contain five major sections. They (1) provide a definition of old-growth forests, and (2) in addition to that state that DEM will preserve and maintain the integrity of existing old-growth stands, (3) "restore" old-growth where appropriate and utilize these areas as buffers, (4) prepare site-specific management plans and (5) create old-growth attributes in managed stands. Following is an explanation of these policies in detail.

A Definition of Old Growth:
Various definitions of old-growth forests have evolved over the last several decades and now include stands that previously were not considered to be old-growth. These definitions will, no doubt, continue to evolve and become more quantitative as more becomes known about these forests. A national effort has been underway since 1988 to develop and refine definitions of old-growth conditions in thirty-five eastern forest associations (White and Lloyd, 1994). This effort is being spearheaded by the U.S. Forest Service's Southern Region and is being carried out in cooperation with the Nature Conservancy. In addition to that, a number of scientists are working independently to study old-growth forests in the northeastern United States. Presently, the Department of Environmental Management subscribes to the criteria put forth by Cogbill (Cogbill, 1996) and Dunwiddie (Dunwiddie, 1993) as follows:

Minimum stand size
Stands greater than 5 to 10 acres are considered to be large enough to be self-sustaining in spite of natural disturbances and attrition. From a practical standpoint, stands of this size are also efficient to map and administer.

Lack of disturbance
There should be no evidence of significant, human post-European settlement disturbance - the most common forms of disturbance are either timber harvesting or agricultural use.

Age of older trees
Old -growth forests should have a component of old trees that are greater than 50% of the maximum longevity for that particular species. Little is known about this aspect of forest development. However, several sources of this information are available and will be consulted when appropriate (Fowells, 1965; Harlow, et. al. 1996; and Stahle, 1996).

Regeneration
Although old-growth stands are recognized primarily by the presence of old trees, to be self-perpetuating they must have a component of trees in younger age classes that can be recruited to fill voids in the canopy as overstory trees become senescent and die or as gaps are created by external influences.

In addition to the aforementioned features, old growth stands have other characteristics that are unique. Classic, textbook old-growth stands have a preponderance of large, tolerant, late-successional species such as hemlock, beech and sugar maple. Until recently, stands of this nature were the only ones that were considered as old-growth stands. The composition of stands sampled by Dunwiddie and Leverett (Dunwiddie and Leverett, 1996) ranged from pure hemlock through mixed hemlock-hardwood stands to pure hardwood stands. Early and mid-successional species such as white birch, white ash and black cherry, though not always lacking, do not occur in great numbers in these stands (Dunwiddie and Leverett, 1996). The old-growth stand on Mount Wachusett is the only one east of the Connecticut River in Massachusetts and is the only documented old-growth stand in Massachusetts that has a significant oak component (Cogbill. 1996; Foster, et. al. 1996).

Generally speaking, old-growth stands have greater amounts of coarse woody debris (cwd - dead limbs, stems and other woody material that is on the forest floor and is generally greater than 3" in diameter) than most younger stands. A recent study (Whitbeck, 1995) in the Cold River area of the Mohawk Trail State Forest showed the mean accumulation of cwd to be 30 tons per acre. The mean accumulation in nearby second-growth stands was 9 tons per acre. There was a great deal of variation, however, in both the old-growth and the young stands. Old-growth stands probably have more large, standing dead or structurally unsound live trees than younger stands. Previously disturbed middle-aged stands may have greater numbers of smaller and medium size snags than old-growth stands (McComb and Muller, 1983). However, the basal area of dead trees may remain constant through most developmental stages (Tritton and Siccama, 1990).

Gaps, or openings in the crown canopy, are another structural feature of old-growth stands. These gaps may range in size from a small gap created by the death of an individual tree to a large gap created by an extraordinary meteorological event. These gap-forming events are most often episodic, occurring infrequently after long intervening periods with little or no disturbance. A good example of a recent disturbance of this nature is the beech scale-nectria complex, consisting of a beech scale insect and a nectria fungus that was imported from Europe. It was first noted in the Canadian Maritime Provinces in the late 1800s (Shigo, 1972). The first recorded outbreak occurred 30 years later and the complex slowly spread southwesterly, reaching western Massachusetts in the 1960s. The complex created a tremendous amount of beech mortality (Twery and Patterson, 1984) and led to the establishment of gaps of various sizes, regeneration within them and a surge of coarse woody debris (Houston, 1975). This occurred in both second-growth and old-growth forests and its severity varied depending on stand composition.

Other examples of severe episodic events are the ice storms that the Northeast has experienced in 1921, 1942, 1958 and 1998. The effects of these ice storms are often restricted to a particular elevation with forests above and below the affected elevation remaining unaffected. Hurricanes are the most common, widespread meteorological disturbance in the New England region. The 1938 hurricane and many other lesser hurricanes have caused disturbances that have caused damage across entire landscapes. Tornadoes and microbursts are other gap-forming phenomena that are local in nature, but have significant impacts. It is unlikely that a "steady state" (where annual or periodic growth equals mortality) is ever really achieved in Massachusetts' forests except perhaps on a vast, regional landscape scale.

In Massachusetts, old growth forests are found where they have been protected either by severe topography from anthropogenic disturbance and severe weather and/or they occur on sites where the trees have little value for consumptive uses because the cost of their extraction exceeds their value for commodity uses.

Preserve and Maintain the Integrity of Existing Old-Growth Stands.
Areas that meet the criteria for old growth, as set forth in this policy, are excluded from any manipulative activities. Wildlife habitat improvement, road and trail construction, conversion to other land uses, silviculture and other activities that may have an adverse effect on old-growth forests will not be permitted. A natural disturbance such as a windstorm in an old-growth area will not be cause for its old-growth designation to be withdrawn. In most instances DEM will not implement remedial measures following natural disturbances that occur in old-growth areas. Exceptions to this may occur when intervention is required to reduce or forestall damage to the ecosystem as a whole or to ensure the public's safety. A severe insect or disease infestation, are two examples of situations that might lead to intervention, particularly from introduced pests, and human-caused wildfires. If remedial measures are undertaken it will only be with methods that create minimal disturbance. Guidelines for implementing this policy will be developed locally in the site-specific plans described below. Existing, low-impact uses such as hunting, fishing, pedestrian use on existing trails, etc. will continue to be allowed. The maintenance of existing roads and trails that pass through old-growth areas will be permitted, but will be restricted to the existing corridor.

Buffers adjacent to old-growth stands are necessary to minimize the influence of adverse edge effects and reduce the potential for the invasion of species that may have a deleterious effect on the old-growth ecosystem. In most cases, on DEM lands, old-growth areas are embedded in larger areas of protection forest that will remain unmanaged to serve as buffers and other resource protection functions. DEM will establish and maintain buffers adjacent to isolated old-growth stands that occur outside of protection forests. In so far as possible, these buffers will consist of forested areas where disturbance is either precluded or minimized. The location and extent of these buffers will be dealt with in the site-specific management plans that will be prepared for each stand or aggregation of stands.

Recently, growing interest in old-growth forests has led to the increased use of these areas by the general public and the scientific community. To minimize any deleterious effects that these activities might have, DEM has instituted a policy of requiring special use permits for formal group visits and for research activities that take place in these areas.

The special use permit:

Identifies responsible individuals.
Ensures that the activities are appropriate for the site.
Assigns liability.
Places time limits on the activities.
Requires that any research findings be shared with both DEM and the scientific community.

Utilize Existing Land Use Zoning to "Restore" Old Growth Characteristics.
As stated earlier, most old growth stands occur in areas where timber harvesting and changes in land use have not occurred because of their inaccessibility and/or steep terrain. On DEM land these areas are already classified as protection forests that preclude conventional forest management activities. It shall be DEM's policy to allow these areas to develop, without human intervention into stands that have characteristics of old growth stands. These areas will never meet the strict definition of old-growth forests since they have been disturbed previously. Nevertheless, over a long period of time they will develop most of the attributes of old-growth forests. In addition, these areas will serve as buffers around core old-growth stands.

In 1979, the Bureau of Forestry's *Forest Management Practices Generic Environmental Impact Report*, classified in excess of 12,300 acres that were withdrawn from conventional forest management. As one might imagine, most of this acreage occurred in Berkshire and Franklin counties. The best example of one of these areas is the upper Cold River Valley in the Mohawk Trail and Savoy Mountain State Forests. This area includes a broad range of topography, elevations, aspects, soil types, forest types and some of the most productive soils in the Commonwealth are found there.

Prepare Site-Specific Management Plans for Each Designated Old Growth Area
These plans will deal with issues that can only be addressed locally in the context of their immediate environment. The issuance of special use permits, public access, boundary delineation, buffers, response to insects and disease, wildfire, etc. will be dealt with in these plans. Since the plans for stands that are in close proximity to each other can be dealt with collectively, only a minimal number of them will need to be developed. These plans will be a product of a team effort led by the Management Forestry Program staff and will include the property supervisor and staff from the Forest Health Program and the Bureau of Forest Fire Control.

Manage for Old Growth Attributes
Some attributes of old growth stands can be achieved through management of selected, previously disturbed stands (DeGraaf, 1989; Hunter, 1990). Some of these practices are:

Retain live "cull" and standing dead trees.
Many species of wildlife are dependent on cavities in both live and dead trees for their existence (Tubbs, et. al. 1986). Dead trees are also valuable as a substrate for feeding.

Retain coarse woody debris, either as standing trees or down material.
This will be accomplished either by felling certain trees and leaving them or by allowing some trees to remain unharvested and will eventually die (McMinn and Crossley, 1996; Gore and Patterson, 1986).

Leaving some unharvested trees.
This will be accomplished by leaving individual trees or aggregations of trees in otherwise managed stands. These trees could be left in perpetuity or through long rotations (see below). This practice would be used to create a more complex vertical structure and refugia for species that prefer older forests. One of the best opportunities for implementing this is the practice of creating unharvested or partially harvested riparian buffers (Murray and Stauffer, 1995)

Lengthen rotations.
Rather than utilize rotations (a rotation is the planned length of time it takes a stand or tree to achieve a particular level of maturity) that are often as short as 60 to 100 years, some even-aged stands will be allowed to develop for 120 to 150 or more years of age until they are harvested . Trees in some unevenaged stands will be allowed to achieve larger maximum tree sizes than they ordinarily would (Hannah, 1994). There will be significant variation in exactly how this would be applied from site to site.

Practice single tree selection or group selection.
These practices are an appropriate management strategy for some forest associations and condition classes. (Smith, et. al., 1996). This will provide some structural attributes that are characteristic of old-growth stands that may be lacking in second-growth and even-aged stands.

The first three of these practices can and will be applied to some degree in all silvicultural operations on DEM land. Employing lengthened rotations and unevenaged management will require sophisticated site-specific analyses before their implementation. It should be made quite clear that the foregoing management practices are intended to provide old-growth attributes in stands that are managed and should, in no way, be construed as measures for restoring old-growth forests.

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